

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
29 April 2004 (29.04.2004)

PCT

(10) International Publication Number
WO 2004/036176 A3

- (51) International Patent Classification⁷: **G01N 33/543**
- (21) International Application Number:
PCT/US2003/032581
- (22) International Filing Date: 16 October 2003 (16.10.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/418,359 16 October 2002 (16.10.2002) US

(71) Applicant (for all designated States except US): DUKE UNIVERSITY [US/US]; 230 North Building, Research Drive, Box 90083, Durham, NC 27708-0083 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **HELLINGA, Homme, W.** [GB/US]; 5212 Pine Cone Lane, Durham, NC 27705 (US). **LOOGER, Loren, L.** [US/US]; 128 Scenic Drive, Madison, AL 35758 (US).

(74) Agent: **TANIGAWA, Gary, R.**; Nixon & Vanderhye P.C., 1100 North Glebe Road, Suite 800, Arlington, VA 22201-4714 (US).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:
29 July 2004

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 2004/036176 A3

(54) Title: BIOSENSOR

(57) Abstract: Biosensors are made by attaching covalently or non-covalently at least one reporter group to one or more specific positions of a bacterial periplasmic binding protein (bPBP). Upon binding of ligand to the biosensor, there is a change in the signal transduced by the reporter group.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/32581

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G01N 33/543
US CL : 435/287.1, 7.2, 14, 172.1, 287.2; 436/172, 518, 805

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 435/287.1, 7.2, 14, 172.1, 287.2; 436/172, 518, 805

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,277,627 B1 (HELLINGA) 21 August 2001 (21.08.2001), see entire document.	1-4, 15 and 23
X	US 6,521,446 B2 (HELLINGA) 18 February 2003 (18.02.2003), see entire document.	1-4, 15 and 23
Y	US 6,231,733 B1 (NILSSON et al.) 15 May 2001 (15.05.2001), see entire document.	1-4, 15 and 23
Y	WO 98/55853 (AUSTRALIAN MEMBRANE AND BIOTECHNOLOGY RESEARCH INSTITUTE) 10 December 1998 (10.12.1998), see entire document.	1-4, 15 and 23
X	WO 99/34212 A1 (DUKE UNIVERSITY) 08 July 1999 (08.07.1999), see entire document.	1-4, 15 and 23

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

12 May 2004 (12.05.2004)

Date of mailing of the international search report

08 JUN 2004

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
Facsimile No. (703) 305-3230

Authorized officer

Robert A. Zeman

Telephone No. 571/272-1600

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/32581

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claim Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claim Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claim Nos.: 5-14 and 16-22
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

BEST AVAILABLE COPY

INTERNATIONAL SEARCH REPORT

PCT/US03/32581

Continuation of B. FIELDS SEARCHED Item 3:
EAST; MEDLINE, CAPLUS, BIOSIS,

search terms: biosensor, binding protein, glucose, glutamine, arabinose, ribose, dipeptide, histidine, glutamate, aspartate, phosphate, sulfate, Fe(III)